REMARKS

I. Introduction

In response to the Office Action dated November 6, 2002, claims 14-26 have been cancelled, claims 1 and 27 have been amended and new claims 40 and 41 have been added. Claims 1-13 and 27-41 remain in the application. Re-examination and re-consideration of the application, as amended, is requested.

II. Claim Amendments

Applicants' attorney has made amendments to the claims as indicated above. These amendments were made solely for the purpose of clarifying the language of the claims, and were not required for patentability or to distinguish the claims over the prior art. Support for these amendments can be found, for example, at page 7, line 5 and page 8, lines 25-27 of the application as filed. No new matter is involved.

III. New Claims

New claims 40 and 41 have been added. These claims are identical to claims 8 and 38, respectively, except that claims 40 and 41 depend respectively from the independent claims 1 and 27. No new matter is involved.

IV. Non-Art Rejections

On page (2) of the Office Action, claims 1-13 and 27-39 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Applicants have amended independent claims 1 and 27 as indicated above to overcome this rejection.

V. Prior Art Rejections

On page (3) of the Office Action, claims 1-3, 9, 10, 13, and 27-39 were rejected under 35 U.S.C. §102(b) as being anticipated by Coldren, U.S. Patent No. 4,896,325 (Coldren).

Independent claims 1 and 27 are generally directed to a tunable laser and an article of manufacture comprising a gain section for creating a light beam and for providing gain for the light beam (i.e., amplifying) and a phase section for controlling the light beam around a center frequency of a bandwidth. A waveguide for guiding and reflecting the light beam in a cavity included in the waveguide, the waveguide including a relatively low energy bandgap separate-confinement-heterostructure (SCH). A front mirror bounds an end of the cavity; and a back mirror bounds an opposite end of the cavity. Additional gain for the light beam is provided by at least one of the group comprising the phase section, the front mirror and the back mirror in order to partially compensate for losses associated with tuning.

The cited reference does not teach or suggest these various elements of Applicants' independent claims. Particularly, Coldren does not teach or suggest that additional gain for a light beam is provided by at least one of the group comprising the phase section, the front mirror and the back mirror in order to partially compensate for losses associated with tuning. In addition, Coldren does not teach or suggest a tunable laser with a waveguide including a relatively low energy bandgap separate-confinement-heterostructure (SCH).

Coldren describes an improvement for allowing selective tuning of the emitted beam over a broad bandwidth to a diode laser having an active section for creating a light beam by spontaneous emission over a bandwidth around some center frequency and for guiding and reflecting the light beam between a pair of mirrors bounding the active on respective ends thereof to create an emitted beam of laser light. The mirrors each have narrow, spaced reflective maxima with the spacing of the reflective maxima of respective ones of the mirrors being different whereby only one the reflective maxima of each of the mirrors can be in correspondence and thereby provide a low loss window at any time. The preferred mirrors each include a plurality of discontinuities to cause the narrow, spaced reflective maxima wherein the spacing of the discontinuities of one mirror is different from the spacing of the discontinuities of the other mirror so as to cause the wavelength spacing of the maxima to be different. However, Coldren lacks any discussion about gain for a light beam being provided by any sections of the laser other than the gain section, e.g. the phase section or the front and back mirrors. In fact, without the supplemental gain in one of these sections as provided in the present invention, tuning of these sections will result in loss.

The Office Action ignores this aspect of the claimed invention as it merely asserts that Coldren discloses a tunable laser "wherein gain for the light beam is provided by reflecting light between the said mirrors". In contrast, the claims recite that additional gain for the light beam is provided by at least one of the group comprising the phase section, the front mirror and the back mirror in order to partially compensate for losses associated with tuning. Nowhere does Coldren teach or suggest this aspect of the claimed invention or that tuning will provide loss. This is a major limitation of the prior art.

Further, Coldren does not teach or suggest a waveguide including a relatively low energy bandgap separate-confinement-heterostructure (SCH). The Office Action asserts that such a waveguide is taught by Coldren at col. 6, line 37 to col. 7, line 64, however, Coldren only teaches operation of the mirrors bounding the laser. Moreover, Coldren provides no discussion of particular properties of the waveguide anywhere in the detailed description of the invention.

In view of these distinctions, Applicants respectfully submit that the present §102 rejection is overcome as each and every element of the invention as claimed in independent claims 1 and 27 is not taught in the cited reference.

Moreover, the various elements of Applicants' claimed invention together provide operational advantages over Coldren. For example, the present invention provides gain in a configuration that has higher saturation power than is found in quantum-well active regions operating in the typical wavelength ranges. In addition, Applicants' invention solves problems not recognized by Coldren. For example, the present invention recognizes a way to provide gain in an SGDBR mirror and/or phase shift sections to offset the loss that normally accompanies tuning by carrier injection. See page 8, line 25 to page 9, line 2 of the application as filed.

Thus, Applicants submit that independent claims 1 and 27 are allowable over Coldren. Further, dependent claims 2-13 and 28-41 are submitted to be allowable over Coldren in the same manner, because they are dependent on independent claims 1, and 27, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2-13 and 28-41 recite additional novel elements not shown by Coldren.

VI. Conclusion

In view of the foregoing, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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APPENDIX: VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please cancel claims 14-26, amend claims 1 and 27 and add claims 40 and 41 as follows:

1. (AMENDED) A tunable laser comprising:

a gain section for creating a light beam and for providing gain for the light beam;

a phase section for controlling the light beam around a center frequency of a[the] bandwidth;

a waveguide for guiding and reflecting the light beam in a cavity included in the waveguide, the waveguide including a relatively low energy bandgap separate-confinement-heterostructure (SCH);

a front mirror bounding an end of the cavity; and

a back mirror bounding an opposite end of the cavity;

wherein additional gain for the light beam is provided by at least one of the group comprising the phase section, the front mirror and the back mirror in order to partially compensate for losses associated with tuning.

27. (AMENDED) An article of manufacture comprising a sampled-grating distributed Bragg reflector (SGDBR) laser, the SGDBR laser comprising:

a gain section for creating a light beam and for providing gain for the light beam;

a phase section for controlling the light beam around a center frequency of a[the] bandwidth;

a waveguide for guiding and reflecting the light beam in a cavity included in the waveguide, the waveguide including a relatively low energy bandgap separate-confinement-heterostructure (SCH);

a front mirror bounding an end of the cavity; and

a back mirror bounding an opposite end of the cavity;

wherein additional gain for the light beam is provided by at least one of the group comprising the phase section, the front mirror and the back mirror in order to partially compensate for losses associated with tuning.